

Los Angeles Regional Water Quality Control Board

December 12, 2014

Mr. John Willis
Wastewater Plant Supervisor
City of Ventura
Ventura Water Reclamation Plant
P.O. Box 99
Ventura, CA 93002-0099

APPROVAL OF COMBINED WORK PLAN FOR PHASE 3 ESTUARY, NUTRIENT, TOXICITY AND GROUNDWATER SPECIAL STUDIES FOR VENTURA WATER RECLAMATION FACILITY (ORDER R4-2013-0174, NPDES NO. CA0053651)

Dear Mr. Willis,

On October 27, 2014, the Regional Water Control Board, Los Angeles Region (Regional Board) received the *Combined Workplan for Phase 3 Estuary, Nutrient and Toxicity, and Groundwater Special Studies* (Workplan) required by Order R4-2013-0174, prepared by the City of Ventura, Heal the Bay, and Ventura Coast Keeper/Wishtoyo Foundation (Refer to Attachment A). On November 19th, Regional Board staff attended the Santa Clara River Estuary (SCRE) Special Studies Kickoff Meeting and received the Phase 3 Estuary Studies Schedule attached herein as Attachment B.

Order R4-2013-0174 requires Phase 3 Estuary Studies which will clarify the City's water budget analysis for the Santa Clara River Estuary and determine whether any effluent discharge is needed to sustain the Estuary's native species, and if so how much. The Phase 3 Estuary Studies final reports are due by January 1, 2018 and must provide sufficient information for the Regional Board to determine if the effluent enhances the Estuary and how much effluent discharge is needed to sustain the Estuary's native species. Additional requirements are as follows:

- i. "Nutrient and Toxicity Special Study - The Discharger must perform a special study to identify the cause of nutrient, dissolved oxygen and toxicity impairments in the Estuary. If it is determined that the effluent from the Facility is causing the impairments, the Facility must propose a plan for reducing nutrient loading, including ammonia, nitrogen and phosphorus loading and toxicity impairments.
- ii. Groundwater Special Study – the discharger must perform a special study to document the interaction between the estuary, discharge and groundwater and determine if the beneficial use of MUN applies to the water impacted by the discharge."

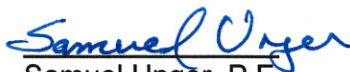
Based on communication with the City of Ventura and discussion with Jason Wiener from the Ventura Coast Keeper/Wishtoyo Foundation, modifications have already been incorporated into the Workplan to address data gaps identified by Heal the Bay and the Ventura Coast

Keeper/Wishtoyo Foundation at the end of Phase 2. Regional Board staff has reviewed the Workplan and approves it with the following additional requirements. Resubmitting the Workplan to incorporate these comments is not required:

1. Per the schedule provided in Attachment B, meetings will be scheduled with Heal the Bay and the Ventura Coast Keeper/Wishtoyo Foundation during the execution of the Workplan. Regional Board staff will also be invited to those meetings. To ensure that the objective of the Phase 3 studies is met and that the data gaps are being adequately addressed, the data available at the time of the meeting will be summarized and distributed as drafts to the attendees.
2. The Attachment B schedule also includes a meeting with Heal the Bay and the Ventura Coast Keeper/Wishtoyo Foundation prior to the submittal of the draft report by August 2017. Data summary and alternative analyses tables are to be reviewed and discussed during that meeting so that the draft report can incorporate and, hopefully, resolve comments prior to the draft report submittal. The draft report is due to the Regional Board no later than September 1, 2017.
3. Phase 3 builds upon the data and information generated by Phases 1 and 2. To adequately present the information to demonstrate enhancement and to justify the recommended effluent discharge flow rate needed to sustain the estuary's native species, the results of Phase 1 and Phase 2 must also be summarized and included in the report. In addition, the data gap analysis that was used to define the scope of Phase 3 should also be included and discussed in the draft and final reports.
4. Per Order R4-2013-0174, the final report results must include a finding on estuary enhancement and a recommendation of the effluent discharge flow rate needed to sustain the estuary's native species. The Data Analyses and Reporting section in the Workplan does not specifically address this requirement. Rather than revising and resubmitting the Workplan at this time, the Regional Board requires that a Data and Alternative Evaluation Workplan to specifically address this objective be submitted to the Regional Board no later than January 1, 2017.
5. The Phase 3 final report is due to the Regional Board by January 1, 2018. In addition to an approval page signed by the primary authors of the report, the report shall also include an approval page from the Scientific Review Panel.
6. The Phase 3 final report shall also include a table summarizing the response to all of the comments received on the draft report.

With these modifications, the Regional Board approves the Workplan. If you have any questions or need additional information, please contact Elizabeth Erickson at (213) 576-6665 (Elizabeth.Erickson@waterboards.ca.gov), or Cris Morris at (213) 620-2083 (Cris.Morris@waterboards.ca.gov)

Sincerely,


Samuel Unger, P.E.
Executive Officer

Attachment:

- A. Combined Work plan for City of Ventura, Phase 3 Estuary, Nutrient and Toxicity and Groundwater Special Studies with redline changes by Heal the Bay and Ventura Coast Keeper.
- B. Draft Schedule of City of Ventura – Phase 3 Estuary Studies.

cc.

Keali Bright, California Natural Resource Agency
Betty Courtney, California Fish and Wildlife
Chris Delith, US Fish and Wildlife
Shana Epstein, General Manager, Ventura Water
Jonna Engel, California Coastal Commission
Gerhardt Hubner, County of Ventura Watershed Protection
Brittany Struck, National Marine Fisheries
Rich Rozzelle, California State Parks and Recreation
Peter Shellenbarger, Heal the Bay
Antal Szijj, US Army Corp of Engineers
Jason Weiner, Ventura Coast Keeper

ATTACHMENT A

**City of San Buenaventura, Ventura Water Reclamation Facility
Combined Workplan for Phase 3 Estuary, Nutrient and Toxicity, and
Groundwater Special Studies in Compliance with
California Regional Water Quality Control Board, Los Angeles Region,
Order R4-2013-0174, Special Studies Provision**

1. BACKGROUND

The City of San Buenaventura (City) provides wastewater collection and treatment service for the City and some adjacent unincorporated areas. The Ventura Water Reclamation Facility (VWRF) treats the wastewater to tertiary standards. A portion of the tertiary effluent is reused and the remaining effluent is discharged to the Wildlife Ponds and then to the Santa Clara River Estuary (SCRE).

Under the Enclosed Bays and Estuaries Policy, the RWQCB may issue a NPDES Permit that allows for continued VWRF discharges so long as the discharges “would consistently be treated and discharged in such a manner that *it would enhance the quality of receiving waters* above that which would occur in the absence of the discharge.” While adopting the 2008 Order, the RWQCB found that it had inadequate information with which to determine whether and to what extent the discharge that could be authorized by the permit continued to constitute an enhancement. Also, the Board lacked the information necessary to determine what, if any, negative impacts would occur to the SCRE if the discharge was prohibited, and therefore lacked the information necessary to dispute the previous enhancement finding. Therefore, the City’s previous NPDES permit (Order R4-2008-0011) required three Special Studies; an Estuary Subwatershed Study, a Recycled Water Market Study, and a Treatment Wetlands Feasibility Study (collectively referred to as Phase 1 Studies) and a Phase 2 Estuary Subwatershed Study. The City completed the studies between 2008 and 2013 (listed in Attachment X), and fulfilled requirements of the 2008 Order No. R4-2008-0011.

At the conclusion of the Phase 2 studies, several stakeholders still had concerns about identified data gaps and the study findings. In response to these concerns, the RWQCB adopted the City’s current NPDES Permit (R4-2013-0174) (Permit) for the VWRF with requirements to conduct special studies. These special studies, as described below, include the Phase 3 Studies, a Nutrient and Toxicity Special Study, and a Groundwater Special Study:

- Phase 3 Studies - The Discharger shall perform additional estuary studies to provide sufficient information to allow the Regional Water Board to determine whether or not the continued discharge of effluent enhances the SCRE. The study will clarify the water budget analysis for the SCRE, to

determine whether any effluent discharge is needed to sustain the SCRE native species, and if so how much.

- Nutrient and Toxicity Special Study - The Discharger must perform a special study to identify the cause of nutrient, dissolved oxygen and toxicity impairments in the SCRE. If it is determined that the effluent from the Facility is causing the impairments, the Facility must propose a plan for reducing nutrient loading, including ammonia, nitrogen and phosphorus loading and toxicity impairments.
- Groundwater Special Study – the Discharger must perform a special study to document the interaction between the SCRE, discharge and groundwater and determine if the beneficial use of MUN¹ applies to the water impacted by the discharge.

2. PURPOSE AND APPROACH

This combined Workplan addresses the three studies identified in the Permit. The Phase 3 Studies includes targeted data collection efforts and routine monitoring activities, which will provide data that will also be used for the other special studies. Therefore, there are efficiencies in combining the Workplans for the three special studies into one Workplan. The final report will summarize the work to date on (1) determination of enhancement; (2) causes, extent and elimination of toxic effects related to ammonia, dissolved oxygen, metals and nitrogen loading; (3) functionality of the estuary as measured by conditions of aquatic and terrestrial habitat; (4) the potential for beneficial uses of groundwater; and (5) the long-term stability or risk associated with treatment designs proposed in response to the work plan. The following sections provide information on monitoring locations, study objectives, proposed monitoring activities and analyses to address identified data gaps, and a schedule.

3. MONITORING LOCATIONS

The proposed monitoring locations and their approximate locations are briefly described in Table 1 and shown in Figure 1. The monitoring locations were selected to capture various hydrologic inputs and/or outputs to the SCRE, and to provide adequate spatial resolution within the SCRE. Upon implementation of the monitoring activities described in this document, effort will be made to implement monitoring at these locations, however, minor adjustments may be necessary to accommodate for field conditions.

¹ Any water designated as municipal or domestic supply (MUN) in a Regional Water Board Basin Plan.

Table 1. Description of Monitoring Locations			
Monitoring Location	Parameter Type	Description	New Location
Effluent Inflows to the Santa Clara River Estuary			
ETS ¹	Flow, Water Quality	VWRF effluent discharge into the Ponds (location is the Effluent Transfer Station)	—
D-1 ²	Flow, Water Quality	Outflow (predominantly effluent) from the Ponds into the SCRE via the “partial flume”	—
Surface Water Inflows to the Santa Clara River Estuary			
VCWPD Stn 723	Flow	River flow into the SCRE near Victoria Avenue	—
R-1 ³	Water Quality	River flow into the SCRE near Harbor Boulevard (location moves with SCRE flooding)	—
E-3 ⁴	Water Level, Water Quality	McGrath Lake surface water flow into the SCRE	✓
Receiving Water Monitoring Locations			
SR-1, SR-2 ⁵	Water Level	SCRE sites for monitoring stage	—
E-1 ⁶	Water Quality	Downstream location within the SCRE near river mouth (location moves with SCRE flooding and most recent outlet position)	—
E-2	Water Quality	Upstream location within the SCRE (location moves with SCRE flooding)	—
North sonde ⁷	Physical Parameters, Water Quality	Outfall channel upstream of discharge into the SCRE (Continuous/monthly monitoring site)	—
Central sonde ⁸	Physical Parameters, Water Quality	Within the SCRE (Continuous/monthly monitoring site)	✓
South sonde ⁹	Physical Parameters, Water Quality	Within the SCRE (Continuous/monthly monitoring site)	—
Groundwater Inflows to the Santa Clara River Estuary			
GW-1, GW-2, GW-3	Water Level, Water Quality	Groundwater inflow/outflow from the south of the SCRE	—
GW-4, GW-5	Water Level, Water Quality	Groundwater inflow from the north. Located east of the SCRE near Victoria Avenue	—
GW-6, GW-7	Water Level	Groundwater inflow/outflow from the south. Located east of the SCRE boundary near Victoria Avenue	—

Table 1. Description of Monitoring Locations			
GW-8	Water Level, Water Quality	Groundwater inflow from the north. Located near southeast corner of Golf Course Maintenance Yard	✓
GW-9, GW- 10, GW-11	Water Level, Water Quality	Groundwater inflow from the north. Up gradient wells, near SCRE boundary, immediately east of Harbor Blvd	✓
GW-12, GW- 13, GW-14, GW-15 ¹⁰	Water Level, Water Quality	Seepage from the Ponds into the SCRE (Piezometers located down-gradient between the Ponds and the SCRE)	✓
Notes: ¹ ETS designated as "M-001" in NPDES permit R4-2013-0174, Table E-1 and Attachment B – Map ² D-1 designated as "M-001A" in NPDES permit ³ R-1 located near "R-005" receiving water monitoring station in NPDES permit ⁴ Monitoring station will be established near the point of inflow from McGrath Lake ⁵ SR-2 located near "R-001" receiving water monitoring station in NPDES permit ⁶ E-1 located near "R-003" receiving water monitoring station in NPDES permit ⁷ North sonde located near "R-004" receiving water monitoring station in NPDES permit ⁸ Central Sonde located between the North sonde and South sonde, and in a deep part of the SCRE near the beach berm/mouth (see Figure 1) ⁹ South sonde located near "R-002" receiving water monitoring station in NPDES permit ¹⁰ Wells located to avoid direct surface water connection from ponds			

CITY OF VENTURA PHASE III AND SPECIAL STUDIES

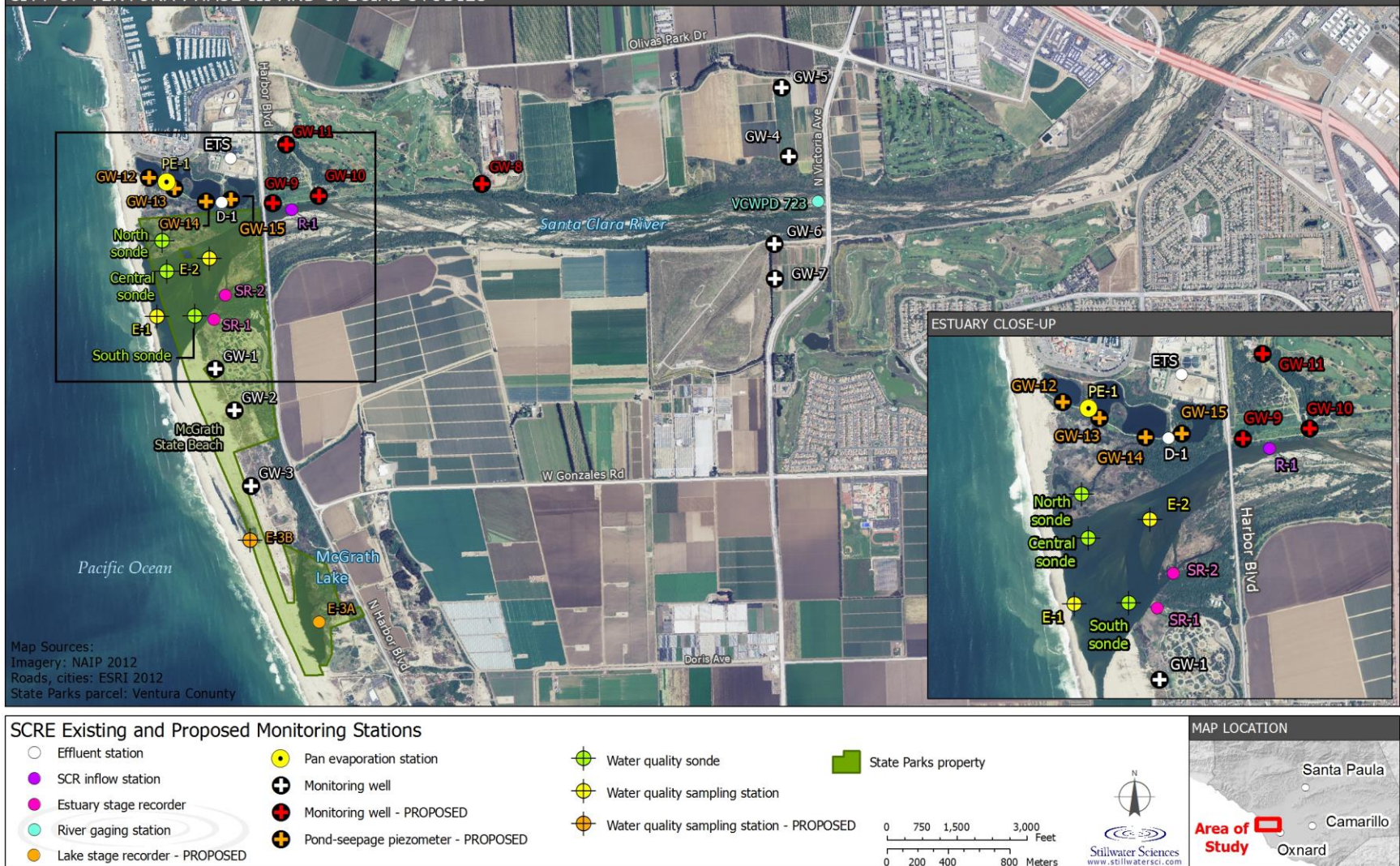


Figure 1. Existing and proposed monitoring stations in the vicinity of the SCRE

4. WORKPLANS FOR THE SPECIAL STUDIES

Phase 3 Studies

The Phase 3 Studies' components outlined below were developed through review of the previous Phases 1 and 2 estuary study results and comments provided in the stakeholder process. Proposed Phase 3 Study components will address the following:

- Water balance evaluation – Additional data will be collected to refine the water balance, with specific focus on improving estimates of groundwater inflows/outflows, area of inundation, river stage, and breaching of the SCRE using definition developed in the existing hydrology model (Stillwater). Note: this information is also needed for the Groundwater Special Study.
- Water quality evaluation – Additional data will be collected to refine the characterization of water quality in the inflows/outflows of the SCRE. This component of the study will address spatial variation in SCRE surface water and groundwater quality, as well as the quality of other inputs/outputs, and the extent and changes in toxicity related to ammonia, dissolved oxygen, metals and nitrogen loading in the SCRE. The data will be evaluated to determine how water quality changes with the stage and breaching defined in the water balance study. Note: this information is also needed for the Nutrient and Toxicity Special Study.
- Habitat suitability evaluation – Additional data and information from previous studies will be used to expand upon the depth-area relationship used to evaluate Southern California steelhead, Tidewater goby, California least tern, and Western snowy plover habitat under varying discharge scenarios. Functionality of the estuary as measured by condition of endangered species, aquatic and terrestrial habitat.

Information from these Phase 3 Study components will be integrated to provide conclusions regarding the effects of continued discharges upon sensitive species in the SCRE.

Water Balance Evaluation

The monitoring studies associated with improving the SCRE water balance will meet the following objectives:

- Continued measurements of surface water inflows to the SCRE
- Improved estimates of groundwater inflows/outflows
- Improved estimates of berm breach/closure dynamics

- Updated lagoon morphology (evaluating stage-volume variability with 2000, 2005/2009, and 2012 bathymetric surfaces)
- Estimates of McGrath Lake inflow, which has been identified as a potential inflow source to the SCRE under the current lagoon morphology.
- Assessment of persistent of each modeled case and calculation of risks associated with estuary water balance change during the implementation of the treatment designs.
- Integraton and extension of Stillwater science estuary stage model

Table 2 summarizes the data collection activities associated with refining the SCRE water balance. Figure 1 shows locations of existing and approximate locations of proposed new monitoring stations in the vicinity of the SCRE. Locations of the new monitoring stations (GW 8 through GW-15, E-3) are intended to improve estimates of groundwater and surface water contributions to the SCRE water balance. Final locations are subject to change as the monitoring plan is finalized and depending on site access and/or local hydrogeologic considerations. Monitoring of the water balance components will occur for two water years, roughly between September 2014 and September 2016. In the event of a catastrophic flooding event that damages field equipment, the frequency or duration of monitoring, may be modified to ensure data collection is representative of a range of conditions in the SCRE. In addition, the monitoring duration may be extended should an atypical water-year type, such as drought or wet El Niño conditions, be encountered during the initial monitoring year, thus necessitating additional data collection to adequately complete the water balance evaluation.

Table 2. Water balance evaluation monitoring plan

Water Balance Component	Update Data from Other Source(s)	Existing Monitoring Station(s)	New Monitoring Station(s)	Monitoring Location	Parameter	Frequency	Duration
Precipitation	✓			VCWPD Stn 66E	(+) Volume	Event (open/closed)	2 water years
Tidal Elevation	✓			NOAA Stn 9411340	(+/-) Water Level	Continuous	
Evaporation	✓			VCWPD Stn 239	(-) Volume	Daily	
SCR Surface Water Inflow	✓			VCWPD Stn 723	(+) Flow	Continuous	

Table 2. Water balance evaluation monitoring plan

Water Balance Component	Update Data from Other Source(s)	Existing Monitoring Station(s)	New Monitoring Station(s)	Monitoring Location	Parameter	Frequency	Duration
SCRE Stage	✓ ²	✓		SR-1, SR-2	(+/-) Water Level	Continuous	
VWRF Effluent	✓			ETS, D-1	(+) Flow	Continuous	
VWRF Pond Seepage		✓		Calculated (Pond stage, D-1)	(+) Flow	Continuous	
			✓	GW-12, GW-13, GW-14, GW-15	(+/-) Water Level	Continuous	
Berm Seepage (Hydraulic properties unchanged from original study)	✓			Calculated (SCRE stage, NOAA 941130)	(+/-) Flow	N/A	N/A
South Side Groundwater Stage		✓		GW-1, GW-2, GW-3, GW-6, GW-7	(+/-) Water Level	Continuous	2 water years
North Side Groundwater Stage		✓		GW-4, GW-5	(+/-) Water Level	Continuous	
			✓	GW-8, GW-9, GW-10, GW-11		Continuous	
McGrath Lake Inflow			✓	E-3	(+/-) Water Level, Pumping Activity	Continuous	
Berm Status		✓		City of Ventura Monitoring	Open/Closed	Daily/Event	
Berm Height			✓	City of Ventura Monitoring ¹	(+/-) Elevation	Quarterly/Event (open/closed)	
Lagoon Morphology			✓	2000 and 2012 SCRE Bathymetry ²	(+/-) Volume	Event/As Available	N/A

² Extend existing Stillwater sciences model

Table 2. Water balance evaluation monitoring plan

Water Balance Component	Update Data from Other Source(s)	Existing Monitoring Station(s)	New Monitoring Station(s)	Monitoring Location	Parameter	Frequency	Duration
--------------------------------	---	---------------------------------------	----------------------------------	----------------------------	------------------	------------------	-----------------

Notes:

- ¹ Berm-height fluctuations affect SCRE capacity and breach dynamics and, therefore, require monitoring to update estuary water balance.
- ² Lagoon morphology adjustments affect SCRE capacity and, therefore, require consideration in the update to the estuary water balance. The original water balance utilized a 2005/2009 bathymetric surface. We have since compiled surfaces for 2000 and 2012 that can be readily applied to the analysis. (Sources: McGrath State Park and CSU Channel Islands).

Discharge from McGrath Lake into the SCRE was not previously known and therefore requires monitoring to quantify contributions to the estuary water balance. Hydrologic input from McGrath Lake can be difficult to quantify, as it may vary depending upon SCRE water level, lake water level, beach berm profile, and the manual pumping schedule of McGrath Lake that may result in a surface water discharge to the SCRE when a surface water connection between the SCRE and McGrath Lake is present. A new monitoring station (E3) will therefore be established near the point of inflow from McGrath Lake in order to continuously record surface water input. One stage recorder will be installed in McGrath Lake to continuously monitor lake storage based on a pre-established stage-storage rating curve (URS 2004). Additionally, discharge events will be indicated using thermographs installed at the pump discharge pipes. Use of the resulting pumped volume estimates in the water balance will depend upon evidence of surface water connection (e.g., photographic documentation of open water proximity in the SCRE lagoon to the discharge, flowing water into the lagoon).

Water Quality Evaluation

The monitoring studies associated with improving characterization of SCRE water quality will meet the following objectives:

- Improved understanding of the effects of the VWRP effluent on SCRE water quality
- Improved estimates of groundwater inputs/outputs of nitrogen sources, including seepage from the ponds and effect on SCRE water quality
- Increased spatial and temporal characterization of DO, nutrients, toxicity, salinity, pH and temperature within the SCRE
- Changes in water quality with stages based on or extended from Stillwater science estuary model

- Characterize water quality changes in SCRE related specifically to groundwater input.
- Integration with Corollo Engineering water quality models, metal toxicity and water effects ratio studies.

Table 3 summarizes the data collection activities associated with improving characterization of water quality conditions in the SCRE and the inputs/outputs. Monitoring of the water quality components will occur for two complete water years, per the NPDES permit requirements. Figure 1 shows locations of existing and approximate locations of proposed new water quality monitoring stations in the vicinity of the SCRE. Locations of the new monitoring stations are intended to improve estimates of groundwater and surface water contributions to SCRE water quality. Physical water quality data (Temperature, DO, pH, and EC) will be recorded at all receiving water monitoring locations (R-1, E-2, E-1), with grab samples collected for laboratory analysis of nutrients (algae, NH_4 , TKN, NO_3 , PO_4 , TP) as well as toxicity testing (see Nutrient and Toxicity Special Study), trace metals, and Constituents of Emerging Concern (CECs). Physical water quality conditions (Temperature, DO, pH, and EC) will be measured at three locations (North, Central, and South sonde locations) to better understand stratified DO concentrations, salinity, and temperature levels in the SCRE. At all locations, one sonde will be deployed near the bed of the SCRE with a combined pH/ORP sensor. At the South sonde location, a second sonde deployed nearer the water surface and fitted with a Chlorophyll-a sensor to allow assessment of algal bloom conditions that may occur. During the summer months of June–September 2015, bi-monthly vertical-profile measurements of Temperature, DO, pH, and EC will be conducted via grab samples at sonde locations during monthly maintenance and at E-1 and E-2. If monitoring data collected shows evidence of stratification leading to hypoxic conditions, stakeholders reserve the right to confer with the City to request and secure additional vertical-profile and/or bi-monthly monitoring. Physical water quality conditions (Temperature, DO, pH, and EC) will also be recorded at the habitat suitability sampling sites (see Table 5 below).

Table 3. Water quality evaluation monitoring plan

Water Quality Source	Update Data from Other Source(s)	Existing Monitoring Station(s)	New Monitoring Station(s)	Monitoring Location	Parameter	Frequency	Duration
SCR Inflow		✓		R-1	Temp, DO, pH, EC, Algae, NH ₄ , TKN, NO ₃ , PO ₄ , TP	Monthly/ Event (open/closed)	2 water years
					Trace Metals ¹ , Toxicity ²	Quarterly/ Event (open/closed)	
					CECs ⁴	Annually	
VWRF Effluent		✓		ETS,	NH ₄ , TKN, NO ₃ , PO ₄ , TP	Monthly/ Event (open/closed)	
					Trace Metals ¹ , Toxicity ²	Quarterly/ Event (open/closed)	
					CECs ³	Annually	
D-1 Pond outflow			✓	D-1	NH ₄ , TKN, NO ₃ , PO ₄ , TP, Trace metals, toxicity,effluent tracer, pH, temp, total and fecal coliform, salinity		
VWRF Pond Seepage			✓	GW-12, GW-13, GW-14, GW-15	NH ₄ , TKN, NO ₃ , PO ₄ , TP, effluent tracer, pH, temp, toxicity, salinity	Quarterly	
South Side Groundwater Inflow / Outflow		✓		GW-1, GW-2, GW-3, GW-6, GW-7	NH ₄ , TKN, NO ₃ , PO ₄ , TP, trace metals, toxicity, McGrath Lake tracer, salinity	Quarterly	
North Side Groundwater Inflow		✓		GW-4 ⁴ , GW-5	NH ₄ , TKN, NO ₃ , PO ₄ , TP	Quarterly	
			✓	GW-8, GW-9, GW-10, GW-11			
McGrath			✓	E-3 ⁵	NH ₄ , TKN, NO ₃ , PO ₄ , TP	Monthly/Event	

Table 3. Water quality evaluation monitoring plan

Water Quality Source	Update Data from Other Source(s)	Existing Monitoring Station(s)	New Monitoring Station(s)	Monitoring Location	Parameter	Frequency	Duration
Lake Inflow					Trace Metals ¹ , Toxicity ²	Quarterly/ Event (open/closed)	
SCRE		✓	✓	North, Central, and South sondes (near bottom)	Temp, DO, pH/ORP, EC	Continuous ⁶ / Monthly ⁷	
		✓		South sonde (near surface)	Temp, DO, pH, EC, Chlorophyll-a	Continuous	
		✓		E-1, E-2	Temp, DO, pH, EC, Algae, NH ₄ , TKN, NO ₃ , PO ₄ , TP	Monthly ⁷ / Event (open/closed)	
					Trace Metals ¹ , Toxicity ²	Quarterly/ Event (open/closed)	
				E-1, E-2	CECs ³	Annually/ Event (closed)	

Notes:

¹ Low-level total and dissolved metals include: Copper (Cu) and Zinc (Zn); laboratory analysis by EPA Method 200.8 (ICP-MS), detection limit of 1.0 ug/L (ppb)

² Toxicity testing to be conducted per description under Nutrient and Toxicity Study (see below); results to be reviewed after three sampling events to determine remaining monitoring schedule

³ Constituents of Emerging Concern (CECs) listed in Table 4

⁴ GW 4 will be considered more representative of conditions in the river, while GW-5 provides a reference point of upland conditions.

⁵ Water quality samples will be collected near the point of inflow from McGrath Lake.

⁶ Sondes will be removed from the SCRE during monthly maintenance and replaced to original monitoring location within 24-hours of removal. In the event of inclement weather, sondes will be replaced as soon as possible, as weather permits.

⁷ Monthly measurements of Temp, DO, pH, and EC will be profiled from the surface to the bottom of the water column from October through May at E-1, E-2 and the three Sonde locations. Additional bi-monthly vertical-profile measurements will be collected between June and September. Profiles will use three point sampling (surface, mid-column, bottom) at locations shallower than 3-ft, with 6-inch sampling intervals used for sites 3-ft and deeper.

CECs in the effluent discharge will be monitored annually for at least 2 years by the City, per their NPDES Permit requirements. Within the SCRE, additional CEC sampling will be conducted at 3 locations (R-1, E-1, and E-2) at the same time as the required effluent discharge sampling. The CECs to be measured at

the two SCRE sampling locations are to be the same as those measured in the effluent discharge samples (Table 4).

Table 4. CECs to be measured in effluent discharge and in SCRE	
Parameter	Reporting Level (ng/L)
17a-Ethinyl Estradiol	0.5
17b-Estradiol	0.5
Estrone	0.5
Bisphenol A	10
Nonylphenol & Nonylphenol Polyethoxylates	100
Octylphenol & Octylphenol Polyethoxylates	100
Polybrominated Diphenyl Ethers (PBDE 28, 47, 99, 100, 153, 154, 183, 209)	100 for PBDE 209 and 5 for all others
Amoxicillin	10
Azithromycin	10
Carbamazepine	10
Caffeine	10
N,N-Diethyl-m-toluamide (DEET)	10
Dilantin(phenytoin)	10
Gemfibrozil	10
Ibuprofen (must be sampled if Acetaminophen is not)	10
Iodinated Contrast Media (Iopromide)	10
Sulfamethoxazole	10
Trimethoprim	10
Tris (2-chloroethyl phosphate-TCEP)-TCPP and TDCPP	10
Triclosan	10
Bifenthrin	5
Permethrin	10
Chlorpyrifos	10
Galaxolide	10
Diclofenac	10
Perfluorooctane Sulfonate (PFOS)	40
Fipronil	2
Meprobamate	10
Table source: NPDES permit R4-2013-0174, Table E-8: CECs to be measured in effluent.	

Habitat Suitability Evaluation

The monitoring studies associated with improving the evaluation of habitat suitability under various discharge scenarios will meet the following objectives:

- Better define the special status species habitat use of the SCRE including condition and presence of Southern California steelhead, Tidewater goby, California least tern, and Western snowy plover
- Consideration of additional information/indicators in addition to any modifications to the existing depth-area relationships used to evaluate special status species habitat availability under different discharge scenarios
- Compare physical water quality with spatial variations of species observations and habitat suitability
- Exploratory analysis of species distribution with physical water quality measurements
- Interpretation of estuary functionality based on existing studies, including Nautilus' Environmental bioassessments and new information.
- The stability of water quality and estuary stage conditions and a measure of risk associated with proposed treatment designs to protect habitat and species based on study design

Table 5 summarizes the data collection activities associated with evaluating the habitat suitability of the SCRE. Monitoring of the habitat suitability components will occur for at least one complete water year.

Table 5. Habitat suitability monitoring plan				
Habitat Suitability Component	Monitoring Location	Parameter	Frequency	Duration
Fish Sampling	SCRE perimeter	Species Composition and Abundance ¹ , and Water Quality (Temp, DO, pH, EC) ³	Quarterly/ Event (open/closed)	2 water years
Habitat Mapping	Multiple SCRE locations using GPS	Depth, Substrate, Cover, and Water Quality (Temp, DO, pH, EC) ³	Event (open/closed)	
Benthic Macro-invertebrate (BMI) Sampling	4 SCRE locations (TBD) ²	Species Composition and Abundance, Depth, Substrate, and Water Quality (Temp, DO, pH, EC) ³	Quarterly/ Event (open/closed)	

Notes:

1. The proposed and permitted method of fish sampling will be using beach seines, and will include sub-sampling of fish weight and length of any focal fish species captured (goby, steelhead)
2. To be determined (TBD)
3. Water quality profiles will use three point sampling (surface, mid-column, bottom) at locations shallower than 3-ft, with 6-inch sampling intervals used for sites 3-ft and deeper.

Nutrient and Toxicity Special Study

Several workplan elements have been identified to evaluate the cause of nutrient, dissolved oxygen and toxicity impairments in the SCRE. Proposed components of the Nutrient and Toxicity Special Study include:

- Toxicity and water quality data/literature review – Previous studies will be reviewed to identify potential sources of nutrient, dissolved oxygen, and toxicity impairments that may exist in the SCRE, including trace metals such as copper and zinc.
- NPDES 3-Species Toxicity testing – Surface water samples for toxicity will be taken concurrent with water quality monitoring efforts (Table 3). Three species toxicity testing is being conducted by the City in the fall of 2014 as part of the monitoring requirements of the Permit. The three-species tests include water flea (*Ceriodaphnia dubia*) reproduction and growth, fathead minnow (*Pimephales promelas*) growth and survival, and green alga (*Selenastrum capricornutum* [now called *Pseudokirchneriella subcapitata*]) growth. Depending on the results of the bioassays, single species toxicity testing will be conducted on a monthly basis on the most sensitive species of the three, per the Permit requirements.
- Expanded Toxicity Testing – In addition to the 3 species testing described above, two additional species have been selected with input from technical experts with the intention to find indicator species to better represent the special-status fish species that inhabit the SCRE—steelhead and tidewater goby. Because tidal exchanges with high salinity ocean waters are expected to strongly influence observed toxicity results, the following species will be tested on a quarterly basis depending upon SCRE mouth berm closure status. During closed mouth conditions when freshwater conditions dominate the SCRE, rainbow trout (*O. mykiss*) juveniles³ will be tested along with the most sensitive of either Topsmelt (*Atherinops affinis*) or the amphipod *Hyalella Azteca*, to be determined by an initial screening test. During open mouth conditions and depending upon the observed salinity in receiving water samples, the VWRf discharge would be tested for both the single most sensitive freshwater species (See NPDES 3-species Toxicity Testing above) as well as the single most sensitive marine species, to be determined by screening tests

³ Juvenile test fish are generally 15–30 days old and approximately 25 mm fork length.

of three candidate species: Topsmelt, giant kelp (*Macrocystis pyrifera*), and sea urchin (*Echinoidea*). In the event that receiving water samples collected during open mouth conditions exhibit a range of salinities, all samples in excess of 2ppt will be adjusted to full seawater strength (approx. 35 ppt) for these tests.

Water quality and toxicity evaluation – The expanded toxicity testing results will be evaluated after three sampling events. If these initial results do not indicate significant toxicity effects, consideration will be given to reduce the number of species or sampling sites for the remainder of the monitoring period. The decision to alter the sampling will be made with the input of stakeholders in a workshop setting.

- For reporting purposes, all toxicity data collected will be evaluated and added to data from previous studies to identify potential sources of and changes in nutrient, dissolved oxygen, and toxicity impairments that may exist in the SCRE. Specifically, water quality laboratory results for trace metals and ammonia will be contrasted with species-specific acute and chronic thresholds, including comparison to literature values on sub-lethal acute and chronic effects.
- List potential remediation measures for observed of historical toxicity effects and quantify impacts.

Table 3 summarized water quality sampling locations for nutrient analysis as well as quarterly toxicity testing. Information from these Nutrient and Toxicity Study elements will be integrated to provide conclusions regarding the effects of continued discharges upon sensitive species in the SCRE.

Groundwater Special Study

Several workplan components have been identified to evaluate the interaction between the SCRE, discharge and groundwater to determine if the MUN beneficial use is applicable. Proposed components of the Groundwater Special Study include:

- Water balance evaluation (described above) – Data collected in prior and current studies will be used to refine water balance calculations with a focus on improving estimates of groundwater interactions with the SCRE.
- Hydrogeologic conditions evaluation – Review of data collections in previous and current studies on the subsurface characteristics in the Mound sub-basin, and the hydrogeologic connectivity between the SCRE, shallow groundwater, and the lower aquifer with the water quality requirements of Municipal and Domestic Water Supply (MUN) designated use and all beneficial uses of groundwater and surface water impacted by groundwater.

4. IMPLEMENTATION OF THE WORKPLAN

Following approval of the Workplan, the City will begin implementation of the following:

1. Monitoring Plan Development
2. Review by Scientific Experts
3. Stakeholder Outreach
4. Data Collection
5. Data Analysis and Reporting

Monitoring Plan

A Monitoring Plan for the three special studies will be developed subsequent to RWQCB approval of this Workplan. The Monitoring Plan will follow the monitoring locations, frequency, duration, and general approaches described in this Workplan. It will also provide more detailed information on the following:

- Field/access and timing
- Sample collection and handling methods
- Analytical methods
- QA/QC procedures
- Report Scope and due dates

Review by Scientific Experts

The draft Monitoring Plan will be reviewed by independent experts prior to initiating data collection. The purpose of this review is to obtain objective, third party appraisal of the proposed data collection approach. Although this Workplan has already undergone independent review and the Monitoring Plan is not intended to include new activities, the final Monitoring Plan may be modified by the outcome of this review. It is expected that the experts will remain involved throughout the duration of the studies to provide continuity throughout subsequent review periods. The collection of data and the preparation of the draft status reports and the final report will not be delayed beyond January 2018 to accommodate independent expert review.

Stakeholder Outreach

The City conducted a series of stakeholder workshops during both Phase 1 and Phase 2 Special Studies. Representatives from the RWQCB, resource agencies, environmental groups (NGOs), rate payers, agriculture, local water agencies and City staff attended these regularly held stakeholder meetings. Beginning in November 2014, it is the City's intent to continue holding stakeholder workshops throughout the Phase 3 studies to provide opportunity for stakeholder participation and input.

Data Collection

Data collection will be conducted following the completion of the final Monitoring Plan. Data will be collected in accordance with the manner and methods established in that document.

Data Analysis and Reporting

In general, the analytical and reporting tasks that follow data collection are common across the three studies. These tasks include:

- Data compilation and reduction
- Data analysis
- Draft report
- Final report

Several key analyses are planned to address the specific objectives of the special studies.

Phase 3 Study Analyses

Data analyses will include, but are not limited to:

- Update of the water balance
- Update of nutrient loading estimates to the SCRE
- Evaluation of new water quality data (e.g., metals and CECs) and potential effects on species
- Modified relationship to assess the effects of discharge scenarios on habitat
- Revised evaluation of SCRE conditions at various discharge scenarios
- Integration of new data into previous studies on water quality , hydrology and treatment design.
- Determination of enhancement
- Functionality of estuary as measured by specific quantifiable conditions
- Long-term stability or risk associated with treatment designs proposed in response to work plan results.

Nutrient and Toxicity Study Analyses

Data analyses will include, but are not limited to:

- Combined evaluation of water quality, habitat and biological data to assess if there is evidence of nutrient, dissolved oxygen, and/or toxicity impairment of the SCRE.
- Remedies to address observed toxicity and quantify impacts

Groundwater Study

Data analyses will include but are not limited to:

- Updated water budget analysis that includes revised estimates of groundwater inflow/outflow.
- Evaluation of subsurface hydrogeology and the connectivity between the discharge, SCRE, and groundwater impact on designated beneficial uses..

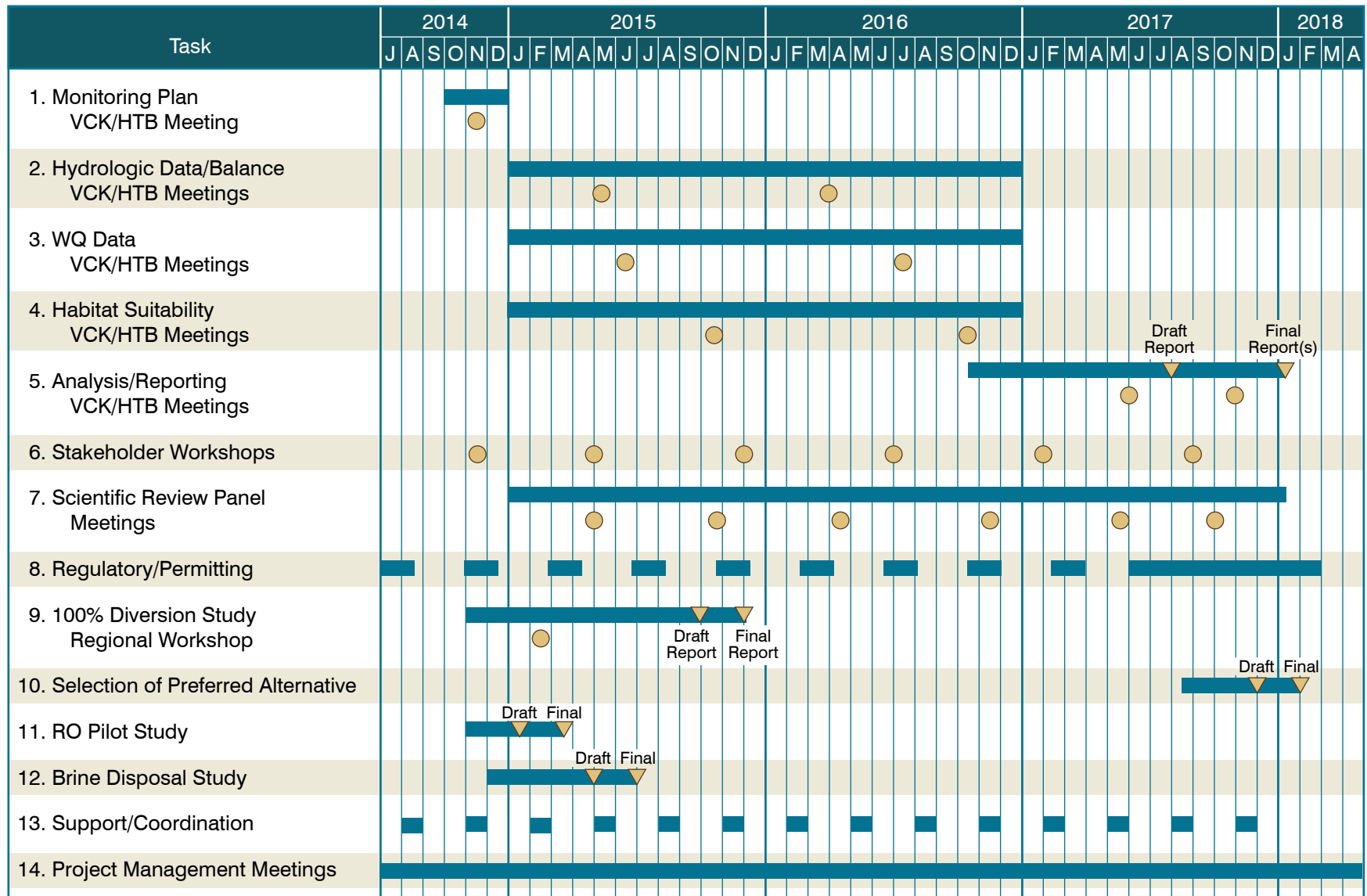
5. **SCHEDULE**

The schedule presented in Table 6 outlines the major tasks, as described in this Workplan, and their proposed start and completion dates.

Table 6. Special Studies Schedule		
Task	Start Date	Completion Date
Draft Workplan		May 6, 2014 (submittal to RWCQB)
Review of Workplan by Scientific Experts	July 2014	August 2014
Final Workplan	August 2014	October 2014
Monitoring Plan	October 2014	December 2014
Data Collection	January 2015	December 2016
Data Analysis and Reporting	January 2017	September 2017
Special Studies Submittal to RWQCB		January 1, 2018

ATTACHMENT B

Draft
CITY OF VENTURA - PHASE 3 ESTUARY STUDIES



LEGEND	
■	Task Duration
●	Meeting
▼	Deliverable